expressed in the horizontal and vertical vectors in Equation 3. This idea is

$$\begin{bmatrix} F(x,y)_{Red} \\ F(x,y)_G \\ F(x,y)_B \end{bmatrix} = \begin{bmatrix} \begin{cases} 1\_if\_M_F(BM_{X,F}+0P_{X,F}+n_xP_{X,F}) < x < M_F(BM_{X,F}+(P_{X,F}-2BM_{X,F})+n_xP_{X,F}) \\ M_FBM_{Y,F} < y < M_F(n_yP_{Y,F}-BM_{Y,F}) \\ 0\_otherwise \end{cases} \\ \begin{cases} 1\_if\_M_F(BM_{X,F}+1P_{X,F}+n_xP_{X,F}) < x < M_F(BM_{X,F}+(2P_{X,F}-2BM_{X,F})+n_xP_{X,F}) \\ and\_M_FBM_{Y,F} < y < M_F(n_yP_{Y,F}-BM_{Y,F}) \\ 0\_otherwise \end{cases} \\ \begin{cases} 1\_if\_M_F(BM_{X,F}+2P_{X,F}+n_xP_{X,F}) < x < M_F(BM_{X,F}+(3P_{X,F}-2BM_{X,F})+n_xP_{X,F}) \\ and\_M_FBM_{Y,F} < y < M_F(n_yP_{Y,F}-BM_{Y,F}) \\ 0\_otherwise \end{cases} \end{bmatrix} \tag{15}$$

obviously portable to other technologies and optical configurations which could form the basis of multi-layered displays.

[0109] The assignments in Equations 15 and 16 may look a confusing to the reader but the pattern within the braces is rather simple and the general form shown above it

$$\underbrace{\phi}_{initial\_phase\_shift} + n\underbrace{P}_{period} < z < \underbrace{\phi}_{initial\_phase\_shift} + \underbrace{\Delta z}_{change\_in\_distance} + n\underbrace{P}_{period} \tag{16}$$

$$\begin{bmatrix} R(x,y)_{Red} \\ R(x,y)_G \\ R(x,y)_B \end{bmatrix} = \begin{bmatrix} \begin{cases} 1\_if\_M_R(BM_{X,R}+0P_{X,R}+n_xP_{X,R}) < x < M_R(BM_{X,R}+(P_{X,R}-2BM_{X,R})+n_xP_{X,R}) \\ M_RBM_{Y,R} < y < M_R(n_yP_{Y,R}-BM_{Y,R}) \\ 0\_otherwise \end{cases} \\ \begin{cases} 1\_if\_M_R(BM_{X,R}+1P_{X,R}+n_xP_{X,R}) < x < M_R(BM_{X,R}+(2P_{X,R}-2BM_{X,R})+n_xP_{X,R}) \\ and\_M_RBM_{Y,R} < y < M_R(n_yP_{Y,R}-BM_{Y,R}) \\ 0\_otherwise \end{cases} \\ \begin{cases} 1\_if\_M_R(BM_{X,R}+2P_{X,R}+n_xP_{X,R}) < x < M_R(BM_{X,R}+(3P_{X,R}-2BM_{X,R})+n_xP_{X,R}) \\ and\_M_RBM_{Y,R} < y < M_R(n_yP_{Y,R}-BM_{Y,R}) \\ 0\_otherwise \end{cases} \end{bmatrix}$$

[0110] The layers are then set-up as shown in **FIG. 2***c*. This situation can be simplified by considering the same image produced on the retina by the rear layer, but where the rear layer is moved very slightly behind the front layer and suitably scaled. This will allow us to determine the final image with point by point multiplication of the separate layers. The use of radiometric rather than photometric quantities is required since the various filters need to be modelled. To scale this object, such that the image on the retina remains the same examine **FIG. 2***c*. Start with the fact that the area has to be preserved and from thin lens theory it is know that

$$x_R = \frac{z_0}{z_R}x_o = \frac{z'}{z_R}x' \Leftrightarrow x' = \frac{z_0}{z'}x_0$$

and similarly

$$y' = \frac{z_0}{z'}y_0.$$

The illuminance on a plane a distance z away from a flat surface imaged by a thin lens (**10**) is

$$E = \frac{\Phi}{a} = \frac{LA'S}{az'^2}\cos^4(\theta) \tag{17}$$

$$= \frac{L\left(\frac{z_o}{z'}\right)^2 AS\cos^4(\theta)}{az'^2}$$

$$= \frac{LAS\cos^4(\theta)}{az^2} \tag{18}$$

where S is the area of the lens (**10**), L is the luminance of the rear display (**11**), A is the area of a small element on the rear display (**12**), a is a small element on the lens, Φ is the flux